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# THE LARYNGOSCOPE.

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## THE FENESTRATION OPERATION. OBSERVATIONS ON THE EVALUATION OF HEARING TESTS.\*†

J. R. LINDSAY, M.D.,  
Chicago, Ill.

Many reports of results from the Lempert nov-ovalis fenestration operation<sup>1</sup> have now appeared in the literature.

The estimated percentage of successes and failures has varied to some extent, but the basic fact has been established that satisfactory results may be achieved in a sufficiently high percentage to warrant the operation in suitable cases. The variation in results may in some instances reflect the technical skill of the operator and the technique followed, but there are also other factors to be considered, in particular the criteria used for selection of patients, and the methods used for evaluation of results.

A statement of the percentage of good results falls short of giving a complete picture. There are varying degrees of success, and although the hearing may be improved above the 30 db. average threshold for speech frequencies and be generally satisfactory to the patient, many of these must be considered as only partly successful, in that the maximum postoperative gain may not have been maintained, or may never have reached the level that apparently could be expected.

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\*Presented before the Dallas Southern Clinical Society, March, 1947.

†From the Division of Otolaryngology of the University of Chicago.

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It would appear that several problems remain to be solved in connection with the operation, three of which are: the establishment of criteria for evaluation of the possibilities for improvement in each case, the maintenance of a fenestra which will permit maximum function and the prevention of injury to the sense organ as a result of the operation.

The objective of this report is to present observations which have a bearing upon the first two of these problems.

A comparison of a relatively simple speech test with pure tone thresholds for air and bone conduction before and after fenestration has been made. The object has been to find out to what extent such tests may be utilized in the estimation of the possibilities for hearing improvement. The observations indicate that such tests possess a fair degree of reliability, when carried out carefully under proper conditions.

The progressive changes which develop in the hearing capacity in some cases during the postoperative course have been followed and an attempt made to correlate them with the histologic changes observed in fenestrated monkey's ears.

While the percentage of complete closures of the fenestra in the human is now small, it is evident that some reduction in the capacity of the fenestra to transmit acoustic vibrations within six months is still a common occurrence.

The problem of maintaining a fenestra which will give maximum performance has not yet been completely solved.

TABLE 1.

Number of cases over eight months.....	34	
(Consecutive cases 1 to 34, inclusive)		
Number with average postoperative threshold of 30 db. and over for 512, 1,024 and 2,048 frequencies, and with average gain of 15 db. or over.....	26	76.5%
Number of complete closures.....	4	
Number with average gain over 15 db. but not up to the 30 db. average for 512, 1,024 and 2,048.....	2	
Incomplete closure, with average gain less than 15 db. 2		
No revisions included in the series		
Total number of failures.....	8	23.5%

These results based upon pure tone thresholds have been

compared with a test for the spoken voice at the conversational level.

The test used consisted of a series of 60 monosyllabic words, divided into low, medium and high pitched groups. The tests were made in the sound-treated room with the patient's back to the examiner at a standard distance.

One test was made before operation and one afterwards when the hearing had reached a stable level.

The main value of statistics of this type is to indicate the general trend of results. A further detailed analysis of the successful as well as the unsuccessful cases is necessary for a proper appraisal of various factors and such a statistical analysis is planned at a later time. The observations to be made here are presented because of their practical significance in the selection of the patient for operation, and are necessarily based mainly in the less satisfactory cases and the failures.

#### ANALYSIS OF FAILURES.

The first 10 cases which were operated contributed four failures due to closure, three of them complete, and four cases in which the original gain in hearing was partly lost, although not to a degree that would put them in the class of failures. This high incidence among the early cases suggests that technical faults may have been the main cause for failure. While no gross defects in technique were observed, undoubtedly some did occur. The most probable defects suggesting themselves would be a failure to notice a small bone flake attached to the flap, a layer of fibrin left attached to the flap, or the escape of bone dust or blood into the fenestra. The other four failures include two cases in which faulty selection played a part, since nerve degeneration was present in the speech area, and the hearing gain did not bring the threshold up to the 30 db. average. The other two cases were closures, one incomplete and one complete.

The acceptance of some cases for operation in which the indications of nerve degeneration in the speech area place

them in a borderline group is considered justifiable, the criteria for selection having not yet been clearly established.

#### ANALYSIS OF SUCCESSFUL CASES.

A postoperative threshold of 30 db. or better for the speech frequencies is an indication in most cases of serviceable hearing without a hearing aid. There is included in this group, however, a number in whom the result falls short of what apparently might have been expected. There may have been a decrease in the hearing for low tones in the first six months, yet the permanent improvement for speech remains fairly satisfactory.

Failure to obtain good hearing at the 2,048 frequency has been found to be reflected in the speech tests.

It has been general experience that the most suitable cases are young individuals with relatively better hearing for high than low tones and a bone conduction threshold which is within the normal range up to the 4,096 frequency or beyond.

The hearing improvement in this type of case may reach within 15 db. of normal in the speech frequencies.

Fig. 1 shows six cases in which the hearing after the eighth month postoperative period remained near the best postoperative level. They represent the group which can be classed as satisfactory to patient and surgeon.

The number of cases in which the permanent result shows a considerable decrease from the highest postoperative level, although not beyond the 30 db. average level, forms a fairly large group.

The characteristic change in this group is a loss for low tones, illustrated by four cases in Fig. 2. This depression for low tones occurred from the third to the sixth month, the thresholds being usually stabilized before seven months.

The loss of improvement was greatest at the low tone end of the scale, with a gradual improvement up to the 2,048 and 4,096 frequencies.

The physical explanation for this tendency to lose the hearing for low tones, yet retain a sharp peak at 2,048 and 4,096,

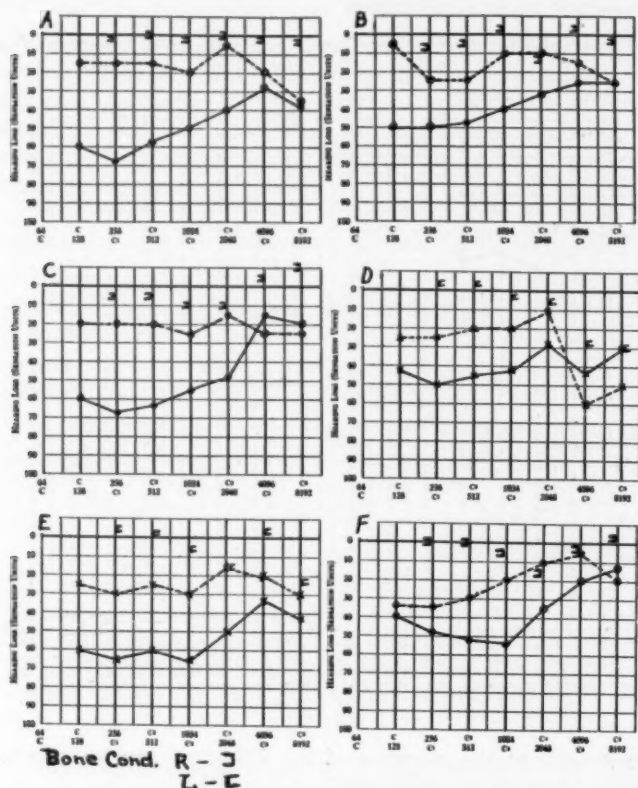


Fig. 1. Audiometric records of fenestration cases illustrating the type of results which are satisfactory to patient and surgeon.

In each case the preoperative air (solid line) and bone conduction thresholds are shown, along with the postoperative air conduction threshold after eight postoperative months (interrupted line).

is not entirely clear. It apparently indicates a decrease in the capacity of the fenestra to function as a sound conductor. A similar type of loss has been demonstrated due to the pres-

ence of a dry crust over the fenestra. Upon removal of a small, dry crust a gain of 15 db. at the 128 frequency has been measured, the gain decreasing proportionately to the frequency up to 2,048 cycles.

Experiments on the monkey have repeatedly shown that

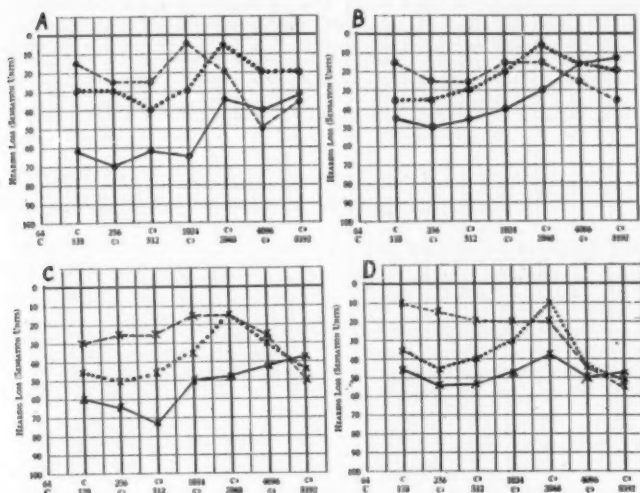


Fig. 2. Audiometric records of four cases to illustrate a partial loss of the hearing improvement during the third to the sixth postoperative month. Preoperative air conduction threshold—solid line. The maximum postoperative gain—interrupted line. Final air conduction threshold, after eight months—dotted line. The maintenance of good hearing at the 2,048 frequency region is associated with good hearing for speech in such cases.

osteogenesis at the margins of the fenestra requires several months to reach an end-point.<sup>2</sup>

Also, the formation of bone in the perilymphatic space in the region of the fistula does not reach an end-point until six months or later.<sup>2,3</sup>

When a local reaction occurs in the perilymphatic space at the site of the fenestra it is characterized by fibrosis for the first few weeks. Osteogenesis is slow, but progresses in the

fibrosed area from the fourth to the sixth month, and possibly longer. Ossification in the perilymphatic space has sometimes been found to encroach on the membranous labyrinth, reducing and even obliterating the lumen.<sup>3</sup>

It appears probable, therefore, that the low tone loss may be related to alterations in physical characteristics at the fenestra. Since the physical characteristics of conduction of sound in the fenestrated ear have not been analyzed, the alterations in the mechanism which occur during healing also are unexplained.

#### CORRELATION OF THE HEARING FOR SPEECH AND THE PURE TONE AUDIOGRAM.

It would appear fortunate that the frequencies in the 2,048 and 4,096 region are most likely to be maintained. A partial closure may apparently destroy the hearing gain for low frequencies, yet the hearing for speech remains good.

The observations of the patient and the speech tests demonstrate that a threshold of 15 db. or better in the 2,048 and 4,096 region is associated with good speech perception (see Figs. 3E and 3F).

A threshold of 15 db. or better in the 2,048 region alone enables the adult to understand speech well (see Fig. 4A). When the pure tone threshold falls off above 1,024 it is reflected in the speech test for words of high pitch (see Figs. 4B and 4C). Such a patient appears to be handicapped to a greater extent than the one shown in Fig. 4A, who had an improvement localized at 2,048.

The improvement in speech perception shown in Figs. 3 and 4 does not represent the gain in hearing in the operated ear. The tests were made for binaural hearing; therefore, the speech test before operation represents mainly the better ear, the poorer ear having been selected for operation. The speech test after operation represents mainly the operated ear, after the hearing has become stabilized.

In the case shown in Fig. 3D the preoperative hearing

threshold was much lower in the operated than in the unoperated ear; therefore, although the binaural hearing gain for

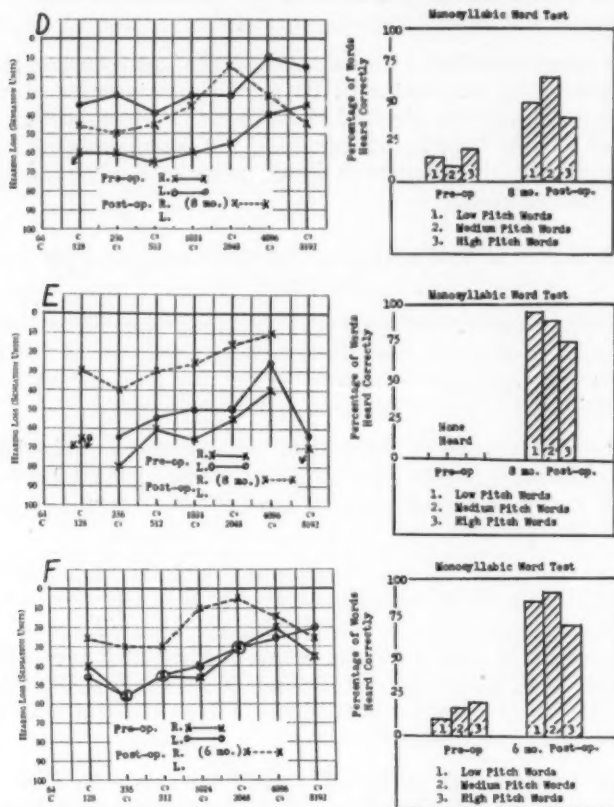


Fig. 3. Correlation of pure tone thresholds with an intelligibility test for selected lists of monosyllabic words. In each case the preoperative air conduction thresholds for pure tones in both ears are recorded as solid lines. The broken line represents the postoperative threshold in the operated ear. In all cases the poorer ear was selected for operation.

The speech test represents binaural hearing before and after operation.

The improvement in hearing for speech therefore reflects mainly the difference between the hearing in the unoperated ear and the operated ear.

For example, in 3D the operated ear had shown much greater impairment than the better ear before operation. Hence the limited improvement for speech is mainly attributable to the marked postoperative improvement at 2,048. The postoperative word tests were routinely made at six to eight months. The gains represented here have been maintained to the present.



speech was not great, the improvement in the operated ear was great, since it then became the better hearing ear.

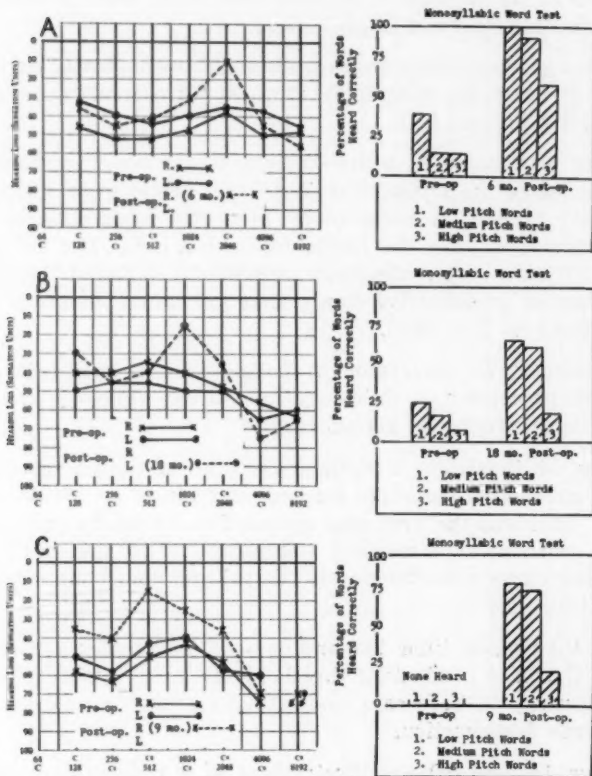


Fig. 4. Correlation of speech test and pure tone thresholds.

The air conduction thresholds are shown for both ears and the binaural hearing for speech. The poorer ear was operated in all cases.

The postoperative air conduction threshold for pure tones in the operated ear is shown by the broken line. The improvement in speech is represented mainly by the improvement in the operated ear over the hearing in the unoperated ear.

In 4A the improvement for speech can apparently be related to the peak at the 2,048 frequency.

In 4B and 4C the failure to obtain a good improvement at 2,048, due to nerve degeneration, is reflected in the speech test for high pitched words.

CORRELATION OF PREOPERATIVE AIR AND BONE CONDUCTION  
THRESHOLDS WITH POSTOPERATIVE AIR CONDUCTION.

A group of cases is presented in Fig. 5 to illustrate some points of significance in the bone conduction tests in estimating the possibility of improvement.

This group includes three cases which were classed as failures because the thresholds attained were inadequate (see Figs. 5B, 5D and 5F).

The occurrence of a dip in bone conduction threshold at 2,048, while the frequencies above and below were within a normal range, has occasionally presented a question as to interpretation. Fig. 5A illustrates such a case. The air conduction curve after operation consistently reflected the bone conduction preoperative curve, thus indicating an inner ear deficiency at that level.

Inasmuch as the region at 2,048 is most important for speech perception, a deficiency in cochlear function at that level is of prognostic significance.

Fig. 5B illustrates a sudden falling off of the preoperative bone conduction threshold starting at 2,048 in an 18-year-old girl. This was the first case operated and was the only case done without a dissecting microscope. The postoperative hearing curve reflected closely the preoperative bone conduction threshold.

At the present time, two and one-half years after fenestration, the bone conduction threshold for 2,048 has decreased significantly in both ears, indicating a probable progression of nerve degeneration.

Figs. 5C and 5D are illustrations of a preoperative bone conduction curve indicating progressive degeneration of the neural mechanism. The thresholds show a loss at 2,048 in each, which increases for higher tones. The postoperative air conduction curves reflect the preoperative bone conduction curves above 1,024 cycles.

Since the cochlear impairment in these cases affects the

most important speech frequency, it is evident that the prognosis for improvement for speech by the operation is directly affected.

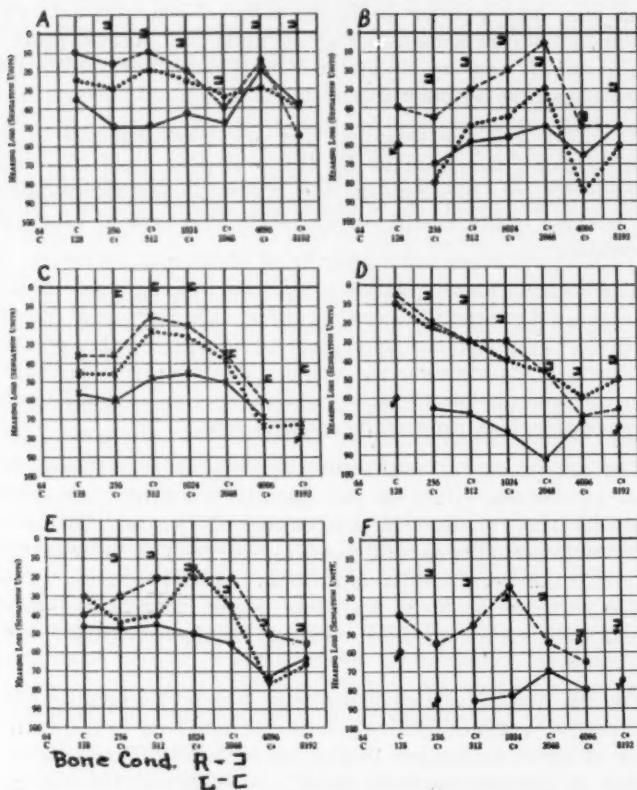


Fig. 5. A group of six cases selected to illustrate the relation of the pre-operative bone conduction threshold for pure tones to the postoperative maximum improvement and the permanent air conduction threshold.

In all cases the bone conduction threshold proved to be a fairly reliable prognostic criterion, in that the limit of improvement to be expected was thereby closely indicated.

Cases B, D and F fail to meet the 30 db. average threshold for speech frequencies and are therefore classed as failures according to that criterion.

Preoperative air conduction threshold—solid line.

Maximum postoperative improvement—interrupted line.

Air conduction threshold after eight months—dotted line.

The result in such a case may fail to reach the 30 db. average for all speech frequencies and, therefore, be classed as a failure according to such a criterion. The fact remains, however, that this same group with nerve deafness in the speech area also has greater difficulty with a hearing aid. For instance, the case shown in Fig. 5D finds that he now prefers not to use his hearing aid under most circumstances, although he is classed as an operative failure.

The fact that the threshold for low tones appears to be more difficult to maintain by the operation than the area from 1,024 to 4,096 renders the prognosis for maintaining the hearing improvement for speech in this type of case less favorable.

The decision as to whether to operate in such cases should take these factors into consideration: the decreased possibility for improvement in perception of speech, the greater difficulty in maintaining the original postoperative improvement for tones below 1,024, and the probability that the nerve degeneration is a progressive phenomenon.

The acceptance of such cases for operation is bound to have an adverse effect on the operator's statistical results, and will increase the total percentage of failures. Observation over a period of several years is necessary to tell whether operation has been justifiable in these borderline cases. Present experience scarcely warrants rigid rules, since good results have sometimes been obtained in apparently unfavorable cases.

Fig. 5E illustrates two features of prognostic significance. Progressive nerve degeneration is indicated by the impairment of bone conduction beginning at 1,024. This was reflected in the postoperative result. In addition, the patient was 52 years of age and the bone conduction for low tones showed a slight loss.

Some degree of nerve degeneration throughout the speech area is seldom absent from the fifth decade of life and the prognosis for hearing improvement apparently decreases in proportion.

Fig. 5F illustrates a patient given a bad prognosis because of the nerve degeneration throughout the whole tone range. The degree of pain corresponded to the preoperative bone conduction curve. Operation was advised against in this case. The continued use of a hearing aid is almost sure to be necessary, and operation where only a partial improvement is possible is scarcely justifiable.

The estimation of bone conduction requires great care and the use of adequate masking. Several tests are advisable when any abnormality in the speech area is in question. In this series of cases a persistent loss for bone conduction proved to be a reliable indication of decreased cochlear function and was consistently reflected in the postoperative result. It, therefore, proved to be of prognostic value.

The greatest pitfall in the estimation of bone conduction in otosclerosis in our experience has been in the application of masking. The main problem arises when there is much asymmetry between the two sides. The bone conduction threshold is then likely to reflect the better ear unless masking is adequate. It appears to be questionable whether masking can be reliably carried out for bone conduction sounds. It is also questionable if an air conduction hearing loss of over 60 db. can occur without some degree of impairment of the perceptive apparatus. In the case with great asymmetry in the air conduction curves, the bone conduction values on testing the poorer ear are likely to be unreliable and appear better than is actually the case. In this series, however, the consistent finding of a depression of threshold for bone conducted sound proved to be a reliable indicator of a decreased possibility for improvement by fenestration.

The third problem mentioned at the outset in this report, the prevention of injury to the cochlear apparatus by the operation, is not included in this discussion. There were no cases in the group in which evidence of significant or gross inner ear damage in the speech frequencies developed. It is possible, however, that a minor degree of inner ear impairment may prove on close analysis to be a common occurrence and may contribute to the variability of results.

## SUMMARY.

Observations are presented which appear to have practical value in the estimation of the patient's prospects from the fenestration operation.

Complete closure of the fenestra after the Lempert nov-ovalis operation has become an infrequent complication.

A decrease in the hearing improvement for low frequencies in the third to sixth month is common and is evident in many cases which may still be classed as successful results.

Hearing for the 2,048 and 4,096 region is most consistently maintained after operation. This region is most important for speech perception.

A comparison between preoperative bone conduction thresholds and the maximum postoperative hearing gain has shown a close correlation.

The possibility for improvement in speech perception appears to be most accurately indicated by the preoperative bone conduction threshold values at 2,048 and 1,024 cycles.

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## CHRONIC ALLERGIC SINUSITIS (PERENNIAL NASAL ALLERGY).

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We used to think that some obscure characteristic of the infecting organism, or some anatomical abnormality in the nose was the cause of chronicity in most cases of so-called chronic sinusitis. Due mostly to the untiring work of Dr. French Hansel,<sup>1</sup> of St. Louis, it is now known that the common cause of this chronicity is an allergic membrane in the nose and accessory sinuses. That this is an important milestone in the conception of chronic sinusitis is being gradually but surely accepted by the medical profession. It gives a rational procedure in the diagnosis and treatment of chronic sinusitis, with the gratifying result of much happier patients.

For the purpose of this article, allergic sinusitis will be defined as an allergic membrane in the nose and sinuses with superimposed secondary infection.

When pure infectious sinusitis clears up, either through conservative or more radical treatment, there is no tendency for recurrence. A good example of this is an antral infection of dental origin. On the other hand, allergic sinusitis goes on indefinitely unless the underlying cause is properly treated, or until the patient spontaneously becomes hyposensitive to the offending allergen or allergens.

### THE ALLERGEN-ANTIBODY MECHANISM IN PERENNIAL NASAL ALLERGY.

There can be little doubt but that at least part of human allergic phenomena are based on the allergen-antibody reaction. The same principles apply here as they do in anaphy-

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laxis and immunology. This mechanism is about as follows:

1. A certain hereditary or biological makeup in the individual is usually present.

2. Usually numerous exposures to the offending allergen are necessary. These exposures build up, in or around the cells of the shock organ, reagin (sensitizing antibody).

3. At some stage of this process the individual becomes hypersensitive. This means that further exposure or massive exposure produces a union between allergen and reagin in or around the cells of the shock organ.

4. This union under the above circumstances produces:

a. Cell damage to the cells of the shock organ.

b. Liberation of histamine from the damaged cells. The histamine probably plays an important factor in the pathology but is probably not the primary factor. It is definitely a more important factor in acute cases, such as angioneurotic edema and hay fever, than it is in the chronic cases. For example antihistamine drugs are fairly effective in hives and hay fever but not so in perennial nasal allergy.

c. Stimulation of the parasympathetic nervous system, probably through the release of acetylcholine.

d. Other unknown biochemical and physiological changes.

Besides this specific immunological conception, the writer believes that there is also a physical allergy mechanism involved in many of these perennial cases. This will be considered later in the article. \*

#### CLINICAL PATHOLOGY.

An allergic reaction that predisposes the nasal shock organ to chronicity has the following pathology:

1. An increase in capillary permeability.

2. Edematous swelling. This swelling is often intermittent.

3. Increased glandular activity with excessive nasal mucus.



This also is often intermittent, the nose at times being very dry.

4. Eosinophilic infiltration into the mucous membrane of the nose and sinuses and also into the nasal secretions.

It is easy to see that this groundwork produces impaired physiology with stagnation, poor aeration, poor drainage and a good place for secondary infection. Even though the infected membrane is carefully and thoroughly excised, the regenerated membrane will again take on its former allergic characteristics. Symptoms will then recur unless the allergic condition is remedied.

#### CAUSE OF THE ALLERGIC MEMBRANE.

If the allergic membrane is the usual cause of chronicity in so-called chronic sinusitis, then what are the usual allergens that produce the pathological membrane? It would seem logical that they be both perennial in nature and also inhalants. Experience has shown that this is true and that the common culprits are house dust, mold spores, tobacco smoke, paper and other perennial inhalants. Since dust, mold, tobacco smoke and paper cannot be eliminated from the patient's environment, they are of primary importance in hyposensitization. In a few cases, foods that are eaten regularly may produce symptoms. Pollens are not often of perennial nature and hence usually are not important in this chronic condition. Physical allergy, to be discussed later, should be added as a common etiological factor.

#### HOUSE DUST.

House dust is especially important in these cases. Recent work indicates that it contains a specific allergen which probably is a decomposition product of cellulose and other materials. The review of this subject by Brown, *et al.*,<sup>2</sup> indicates that mold allergen is distinct from dust allergen, but that the latter contains mold. Dust also probably contains small amounts of most of the other inhalant allergens. Among these are animal hairs, tobacco smoke, orris root, pyrethrum, feath-

ers, cotton, wool, kapok, glue, etc. The older and more decomposed the dust the more allergenic it is. The most satisfactory clinical extract is a well prepared stock dust taken from as many sources as possible.

#### TOBACCO SMOKE.

Pipes,<sup>3</sup> in an article published in 1945, brought out the fact that tobacco smoke extract had different allergenic properties

### Mechanism of Hyposensitization

#### 1. Normal Individual

No sensitizing antibody (reagin) in circulation  
or in cells of shock organ = no symptoms.

#### 2. Hypersensitive (allergic) individual not in contact with allergen.

⊙⊙ reagin but no allergen = no symptoms.

#### 3. Allergic individual in contact with allergen



There is a union of allergen + reagin in cells  
of shock organ = allergic symptoms

#### 4. Allergic individual who has been well hyposensitized + who is in contact with allergen.



Blocking antibody built up in circulation and shock  
organ. Allergen unites with blocking antibody  
instead of with reagin. Union of allergen and  
blocking antibody = no symptoms.

(○ = reagin    x = allergen    ● = blocking antibody)

than tobacco extract. The writer has verified this fact and has found that tobacco smoke is a very important perennial inhalant in perennial inhalant allergy. Tobacco smoke impregnates rugs, furniture, bedding, clothing, automobile upholstery and hence is found most everywhere. In perennial cases

about 50 per cent positive skin tests are found with tobacco smoke. It is very useful in hyposensitization and, in general, it is far more important than tobacco, as such.

#### MOLDS.

The molds that may cause trouble are alternaria, hormodendrum, rust, smut, penicillium and helmenthosporium.

Deamer's<sup>4</sup> survey indicates that hormodendrum is the chief offender in the San Francisco Bay area. Surveys in other parts of the United States indicate that alternaria is most common elsewhere. The following are the important characteristics of the pathological mold allergens:

1. They are found mainly in soil, dust, on vegetation, upholstery, etc.
2. The spores seem to be the allergenic part and are air-borne.
3. They are perennial with seasonal upswings.
4. They may cause many of the so-called summer and autumn colds.
5. Mold allergy is often confused with pollen allergy because mold upswings usually come during the pollen season.

#### PAPER.

In trying to find perennial inhalants that cannot be eliminated from the patient's environment, the writer's attention was focused on paper. This came about especially in the course of taking environmental histories on patients. Consequently, a paper extract was made up from newspapers, magazines, typing paper, etc., and included the different wood pulps, sizing, glue, ink, etc., found in paper. This paper extract has proven to be very useful from both the skin test standpoint and in treatment. Both the tobacco smoke extract and the paper extract were made by Hollister-Stier Laboratories.

## DIAGNOSIS.

A diagnosis of this common condition of allergic sinusitis consists of five procedures. The two most important, in the opinion of the writer, consist of:

1. *A thorough history.*
2. *Examination of nasal secretions for eosinophils.*

Other diagnostic procedures of lesser importance are:

3. Nasal examination.
4. Other laboratory work.
5. Skin testing.

*History* (including complaints and pertinent points to ask patient):

1. Stuffy nose, particularly at night. With this, there is usually a history of having used shrinking nose drops over a long period of time.

2. Postnasal, and at times anterior nasal, discharge. It is usually mucoid, becoming mucopurulent at times. The discharge is also apt to be intermittent, being worse in the morning after arising.

(The first two symptoms are by far the commonest. A *history of a stuffy nose and postnasal discharge usually means allergy.*)

3. Dull, generalized headache with inability to concentrate. The cause of the generalized headache is generalized edema. The headaches are quite different from the localized pain in purulent sinusitis and from the histamine variety of headache.

4. Nasal surgery without permanent relief is a common finding.

5. Sneezing, more apt to occur in the morning on arising and due to the sudden change in temperature from the warm bed to the outside air.

6. Itching of the nose, eyes and throat is fairly common.
7. Chronic cough due to an allergic bronchitis.
8. Ear symptoms (both middle ear and internal ear). This is due to edema and mucus in middle ear and Eustachian tubes, and to edema of the internal ear. Allergic catarrhal middle ear symptoms are fairly common in children.
9. Frequent colds (often allergic flare-ups).
10. Adenoid-type of mouth breathing in children. This is often from an allergic nose and not from hypertrophied adenoid tissue.
11. Fatigue.
12. Chronic hoarseness (edema and mucus in larynx).
13. Sore throat from mouth-breathing.
14. Improvement of symptoms in dry atmosphere, particularly in mountains.
15. Flare-ups from physical and emotional stress (sudden changes in barometric pressure and humidity, drafts, fog, following head colds, etc.).
16. The symptoms are perennial, but often worse in the winter time when people are more indoors.
17. Environmental history is important, both at home and at work.
18. Other allergic symptoms should be asked about: asthma, hay fever, hives, indigestion after eating (may indicate food allergy).
19. Family history of allergy often present; ask about nose trouble, asthma, hay fever, hives, etc., in family.
20. A continuous history is often necessary in dealing with allergy.

*Examination of Nasal Secretions:*

1. Where and how the mucus is obtained.

a. The patient should blow his nose on a small piece of wax paper. This is transplanted to a glass slide (Hansel <sup>1,10</sup>).

b. Depress the tongue with a tongue blade, and with bayonet forceps elevate the soft palate and pick a small piece of mucus off the nasopharynx. Put this on glass slide.

c. Nasopharyngeal suction method.<sup>13</sup> Many chronic allergic noses are at times dry and it may be difficult to get a good smear by having the patient blow the nose. The writer has developed the nasopharyngeal suction method to be used in such cases. This has been very useful in obtaining good smears and gives excellent results. The nasopharynx is the natural and physiological reservoir for nasal secretions and furnishes the logical spot for collection.

*Procedure of Suction Method:* Use a small metal suction tube with a thumb hole for starting and stopping the suction. With suction on, and thumb on thumb hole, place the suction tube along the floor of the nose until the end touches the posterior wall of the nasopharynx. As soon as the mucus can be heard entering the suction tube, remove the thumb from thumb hole, and then remove the suction tube from the nose. The suction tube will usually contain a good specimen of mucus. Disconnect the metal suction tube from the rubber suction tubing and with the thumb replaced over thumb hole, blow mucus out on to a glass slide. Use the same suction method in the throat and lower nasopharynx.

2. Thin out smear on slide and dry gently over flame or with air jet.

3. Label end and make cross mark between label and smear with wax or paraffine pencil. This prevents stain from running over mark.

4. Staining by Hansel's method:

a. Stain with Hansel's quick polychrome stain for about 40 seconds.

b. Flood with neutral distilled water and let stand about 30 seconds.

- c. Wash off with distilled water.
- d. Flood with 95 per cent ethyl alcohol and drain.
- e. Dry slightly over flame.

(The above procedure takes only about two minutes and can be done by nurse or technician.)

The smears need be examined only under low power, and a diagnosis may be quickly and easily made.

Before discussing the types of smears, some important points about the eosinophil are in order. These points are as follows:

A. The finding of eosinophils in the nasal mucus is characteristic of nasal allergy, just as the neutrophil is characteristic of infection.

B. The eosinophil is formed in the bone marrow, gets into the circulation and migrates to the nasal shock organ, and hence may be found in nasal secretions.

C. Eosinophils contain most of the blood histamine. (This has been shown by Code.<sup>5</sup>)

D. They are larger and lighter than neutrophils.

E. A fragile cell membrane is found in the eosinophil, so that granules are often extracellular when seen under the microscope.

F. Staining characteristics (with Hansel's stain): nucleus, blue and binuclear, cytoplasm, granular and bright pink.

G. The neutrophilic response is greater than the eosinophilic response and, therefore, in a head cold and acute sinusitis the eosinophils may be drowned out. This gives an easy way of telling a cold from an acute allergic flare-up; i.e., if the nasal smear shows mostly eosinophils, the condition is an acute allergy flare-up. Many so-called colds are allergic flare-ups.

##### 5. Different types of smears and findings.

a. *Normal nose and normal sinuses.* Few epithelial cells (large, flat cells with small, blue, single nucleus and clear blue cytoplasm). Few neutrophils, lymphocytes, and practically no eosinophils. Blue staining mucus.

b. *Pure infectious sinusitis.* Mostly neutrophils in large numbers in mucus.

c. *Pure allergy.* Mostly eosinophils (in a small percentage of cases there is little secondary infection).

d. *Allergic sinusitis.* Neutrophils and eosinophils mixed at random or eosinophils in clumps surrounded by neutrophils. (Also, mucus and a few epithelial cells.)

It is not at all necessary to count the eosinophils, as with a little experience they can be classified at a glance as one plus, two plus, three plus, four plus (Hansel<sup>1,10</sup>).

This cytologic examination is absolutely essential and is diagnostic. *A complete nasal examination cannot be done without it.*

*Nasal Examination:* Examination of the patient usually reveals little pathology, unless in the very late and irreversible stage. The most common findings are slight swelling of the nasal mucous membranes with some mucus in the nasopharynx. In the later stage we have the pale, edematous membrane often with polyps and excessive mucus. Generalized polyps are pathognomic of allergy.

*Other Laboratory Work:* X-ray findings often show generalized or pan-cloudiness in the sinuses, in contrast to localized or unilateral cloudiness as in pure infectious sinusitis. The cloudiness is apt to be transitory. Blood eosinophilia is not characteristic of this chronic condition and does not coincide with the nasal eosinophilia.

The bacteria involved are usually aerobic streptococci and staphylococci, in contrast to the anaerobic organisms in pure infectious sinusitis (Shambaugh<sup>8</sup>).

*Skin Testing:* The history and cytology will give a diag-



nosis of nasal allergy of perennial nature; this is usually of perennial inhalant origin; however, intradermal skin testing should be done, but need not be done with large numbers of allergens. *A positive skin test means that there is sensitizing antibody or reagin in the skin.* It is usually in the nose also, when the patient has symptoms. *A negative skin test means that there is no reagin in the skin;* however, even with a negative skin test, there often is reagin in the nose if the patient has symptoms. Allergic patients get positive skin tests with about 60 per cent of the perennial inhalants. Testing is done intradermally. The average case is tested with dust extract, mold extract, tobacco smoke extract and paper extract. In some cases, the other inhalants are used also. In a few cases with a positive food history, the foods that are eaten regularly are used in testing. Elimination diets are more useful in checking on foods than skin testing. Any positive food test should be checked further by feeding the specific food. Pollens are not used in testing unless there is a definite seasonal hay fever history or unless the atmospheric slides show pollen in the air during time the patient has symptoms.

The dilution for testing intradermally with dust and other perennial inhalants is from 1:1,000 to 1:100. The control used is Coca's solution, this being the diluent used.

#### TREATMENT.

The treatment of chronic allergic sinusitis may be divided into general and specific:

##### 1. General Treatment:

###### A. Removal of offending allergens.

1. Stop all nose drops. This is important and must be insisted upon. Patients often have used nose drops for months or years and consequently have sensitized themselves to the drops. Temporary shrinkage is obtained, but this constant usage keeps the membranes chronically swollen.

2. Provide dustproof pillow cover. This eliminates inhal-

ing dust every night. In some cases it is also necessary to provide a dustproof mattress cover.

3. Clean up the bedroom. Eliminate rugs and carpets; use hardwood or linoleum floors that can be waxed or mopped. All dusting should be done with oiled cloth. Eliminate moth balls and insect sprays that may be in or near bedroom.

4. Nonallergenic face powder may be necessary.

5. Eliminate animals from house. This is important.

6. Woolen blankets may have to be replaced by cotton ones.

7. Remove woolly and fuzzy playthings from children's environment.

8. Eliminate any definitely allergenic food from diet.

#### B. Drugs.

There are three groups of drugs useful in allergy which may be effective during the early stage of hyposensitization.

1. Sympathetic stimulators or adrenalin-like drugs. The useful ones are:

Adrenalin.

Ephedrine.

2. Parasympathetic or acetylcholine inhibitors:

Atropine group.

3. Antihistamine group:

Benadryl.

Pyribenzamine.

The most useful drug in perennial nasal allergy is the old and reliable ephedrine. A short acting barbiturate, such as seconal or nembutal, is useful to combine with ephedrine. The action of the barbiturate should start and stop about the same time as that of ephedrine. Atropin is added only in cases with excessive thin discharge. Capsules made in the following proportions are very satisfactory:

Large: Ephedrine gr.  $\frac{3}{8}$ , seconal gr.  $\frac{1}{2}$ , atropine gr.  $\frac{1}{250}$ .

Small: ephedrine gr.  $\frac{1}{4}$ , seconal gr.  $\frac{1}{4}$ , atropine gr.  $\frac{1}{450}$ .

These may be given: one, three times daily with meals. The atropine should be omitted in the dry noses.

In children, syrup of ephedrine containing  $\frac{1}{4}$  gr. of ephedrine per dram is very satisfactory. Ephedrine, by mouth, is much more effective than neosynephrine by mouth when used in allergy.

The antihistamine drugs are fairly useful in acute flare-ups, in hay fever, in angioneurotic edema and in hives. In these cases the histamine factor is very prominent; however, the writer has found the antihistamine drugs to be of little value in the ordinary low grade case of perennial nasal allergy where the histamine factor is very minimum. What action they have seems to be more on the side of sedation. Benadryl should not be used with the barbiturates because of the double sedation effect.

Other newer drugs are now being developed which may replace those mentioned above. It is important to remember that since we are dealing with allergic individuals, sensitivity to drugs may develop and hence should be carefully watched for at all times.

2. *Specific Therapy:* The most important and useful thing in therapy is *hyposensitization with the perennial inhalants that cannot be eliminated from the patient's environment.*

A. Former theories of hyposensitization.

Until the recent work of Loveless,<sup>6</sup> the mechanism of hyposensitization has been guess work. The main theories were:

1. That small and increasing parenteral injections of the offending allergen built up so many antibodies in the blood stream that the allergen-antibody union took place here, leaving no allergen to unite with the antibody in the cells of the shock organ.

2. That in some way these injections made the antibodies in or around the cells of the shock organ incapable of acting.

B. Blocking antibody mechanism.

Loveless' great work has shown that there is a two-antibody mechanism involved. There is the sensitizing antibody or reagin that makes one hypersensitive. The reagin is thermostabile. After the patient has been hyposensitized by small and increasing parenteral doses of the allergen, a thermostabile protecting antibody is built up in the blood stream and in or around the cells of the shock organ. This antibody has an affinity for the allergen and unites with it, leaving little or no allergen to unite with the reagin or sensitizing antibody, thus preventing the allergic reaction and allergic symptoms. The union of allergen and blocking antibody does not produce symptoms and gives no positive skin test (see Fig. 1).

Marked improvement in dust therapy has been shown in the last few years with the low dosage schedule as suggested by Hansel.<sup>7</sup> The following points in giving dust and other perennial inhalants are valuable:

1. Very low dosage.
2. Regulate beginning dose by severity of symptoms, and not by skin tests. (In other words, the more severe the symptoms the smaller the dose. This is in contradistinction to pollen dosage where the skin test is a good rule.)
3. Work for optimum and not maximum dose. (As soon as patient's symptoms improve, do not increase dose but increase interval between injections. Do not work up to the dose that will give a general reaction.)
4. Stop injections as soon as patient is comfortable. Patient should return for further treatment if and when symptoms recur. Rest periods enhance immune response. (Loveless has shown this in treating hay fever cases.)
5. There is great exactness in dosage that is satisfactory for individual cases.

6. If result is not good, always try lowering dose; then, if necessary, try raising it.

Any good stock dust extract that is properly made and contains all the necessary ingredients is good. The extract may be diluted with Coca's solution. The other inhalants should also be diluted with Coca's solution.

*Dosage:* In cases with severe symptoms (marked nasal stuffiness, sneezing, excessive discharge) in children and in patients with asthmatic history, the inhalant injections are started with 0.1 cc. of 1:1,000,000,000. Medium cases are started with 0.1 cc. of 1:100,000,000; very mild cases (stuffy nose and postnasal discharge) with 0.1 cc. of 1:10,000,000.

Injections are given twice a week, increasing each dose by 0.05 cc. or 0.1 cc. until improvement. At this stage the dosage remains stationary, but the interval is increased to once per week, then once every two weeks, and so forth. As soon as the patient is comfortable, injections are stopped. With each injection, about 0.05 cc. is given intradermally and the rest subcutaneously; the intradermal stimulation of the skin helps in the immune mechanism. To most dust extract, mold extract should be added in the proportion of one part mold to nine parts dust. In many cases (as determined by the history and skin tests) tobacco smoke allergen and paper extract are also used in about the same dilutions as dust. Smoke and paper may be given together in equal parts; however, care must be taken to insure proper dilutions.

#### SURGERY.

The treatment outlined above is directed toward favorably affecting the allergic membrane which is the basis of the trouble. In pure infectious sinusitis, treatment need be directed only toward eliminating the infection. This may be conservative or may be surgical.

Surgery may also be indicated in the allergic cases, particularly if hyposensitization and other treatment does not give relief. Deviated nasal septa may need correction in

order to improve nasal physiology. Adenotonsillectomies may be indicated in children. In cases with irreversible tissue changes polyps are to be removed and radical antral surgery may be indicated.

The writer believes that rhinologists who carry out good allergic procedures will find that comparatively little surgery will be indicated.

The writer also believes that the rhinologist must do his own allergic work and coordinate all problems of rhinology in order to get good results.

#### PHYSICAL ALLERGY.

In many cases there is evidence of a physical or intrinsic allergy mechanism. Many of these patients give a history of flaring up under the influence of physical or emotional stimuli.

Williams<sup>9</sup> has very good evidence for his theory of physical allergy. His conception is based on his own studies, along with the work of Mueller<sup>11</sup> and that of Selye.<sup>12</sup>

In the microscopic picture of the capillaries in normal tissue is found an arterial limb, central portion and venous loop. The arterial part is narrow, being about one-half the width of the other two. In the central portion, serum transudes into the tissues and also into the venous loop.

Mueller<sup>11</sup> finds that an abnormal capillary picture is found in certain allergic tissues. This picture is as follows: the arterial loop is extremely narrow, while the central loop is greatly dilated and the capillary cells show edematous swelling. The venous limb is quite twisted.

Both Mueller and Williams believe that there is an inherited tendency in some individuals for the development of this abnormal capillary bed when there is exposure to nonspecific stress.

The General Adaptation Syndrome of Selye<sup>12</sup> may be summarized as all of the nonspecific reactions of the body to stress. These are normal physiological and biochemical reactions. They are regulated by the parasympathetic adrenal cortex system, since the reactions do not take place in

adrenalectomized animals. The adrenal cortex particularly regulates cell permeability, electrolyte metabolism and water metabolism.

Williams believes that in physical or intrinsic allergy there is a perversion of this normal physiological function. Thus, we get the abnormal capillary picture in hereditarily susceptible individuals when they are subjected to physical stress, such as sudden changes in weather, fog, chilling, following colds, etc.

It is the writer's opinion that, in perennial nasal allergy, both mechanisms are involved; *i.e.*, antigen-antibody reaction and physical allergy. Both should be studied and treatment should be started in both directions. Treatment of the physical allergy could include environmental therapy, glandular therapy, influencing the capillary loop with histamine or nicotinic acid,<sup>9</sup> etc.

Since the writer has not been particularly successful with this line of treatment, a different method of this physiological and biochemical problem has been instituted. This method was undertaken at the suggestion of Dr. Grant Selfridge, of San Francisco, and attacks the problem along nutritional lines. First, the patient brings in a detailed account of everything ingested for one week. This is then sent to a skilled and trained nutritionist. After careful study, the nutritionist makes a report on deficiencies and how to correct them dietetically. Vitamins and other accessory therapy are added as indicated by the study. It has been found that the patient's usual diet is quite often way out of line.

Microchemical blood analysis will soon be added to the nutritional studies in order to gain further information. As yet, enough information has not been gained in order to report anything definite about this approach to physical allergy.

#### SUMMARY OF IMPORTANT CLINICAL POINTS.

1. The allergic membrane is the common cause of chronicity in so-called chronic sinusitis.

2. The perennial inhalants are the common cause of allergic membrane.

3. The primary treatment should be directed at clearing up the allergic membrane. Any infection should be treated conservatively, unless otherwise indicated.

4. Good history and examination of nasal mucus for eosinophils will make the diagnosis.

5. Many times the nose is dry and difficult to get good specimen.

6. Nasopharynx is choice spot for specimens (suction method).

7. A stuffy nose with postnasal discharge usually means allergy.

8. Examination of nose usually reveals little pathology.

9. The indiscriminate use of nose drops should be stopped because they sensitize the nasal membrane and make it very difficult to improve the allergic condition.

10. Remove perennial inhalants from patient's environment where possible.

11. Hyposensitize with perennial inhalants that cannot be removed from the environment. The most important ones are house dust, mold, tobacco smoke and paper.

12. Blocking antibody mechanism in hyposensitization is important.

13. In hyposensitization with perennial inhalants, the following points are very important:

a. Very low dosage.

b. Optimum dosage.

c. Regulate dosage according to severity of symptoms; more severe the symptoms the smaller the dose.

d. Stop injections when the patient is comfortable; resume injections if and when symptoms recur. Rest periods are important.



14. Physical allergy is often present. Nutritional studies are suggested for this condition.

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## A CASE OF ESOPHAGEAL FOREIGN BODY WITH MEDIASTINITIS AND OTHER COMPLICATIONS.\*

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Cases of esophageal foreign bodies are always dangerous because of the possibility of complications due to perforation of the wall of the esophagus, either by the foreign body itself upon impaction, by instrumentation on removal, or, if left in place for any length of time, by erosion of the wall. A case is herein reported in which a sharp-pointed foreign body pierced the esophageal wall, producing mediastinitis and subcutaneous emphysema. There were other complications which ensued. Final recovery resulted primarily because of prolonged massive use of penicillin.

Perforation of the esophagus has long been known to be a serious if not disastrous occurrence. The textbooks state this but not much else. This is illustrated by the comments of St. Clair Thomson,<sup>1</sup> Lederer,<sup>2</sup> Turner,<sup>3</sup> Jackson<sup>4</sup> and others. Jackson<sup>5</sup> is not very informative about the use of chemotherapy even in his latest book. He simply states, "Chemotherapy may be indicated to control sepsis." There are many reports of cases in the literature through the years starting with Killian, in 1920, as cited by Flett.<sup>6</sup> Tucker,<sup>7</sup> Furstenberg,<sup>8</sup> Orton,<sup>9</sup> Head,<sup>10</sup> Phillips<sup>11</sup> and Clerf<sup>12</sup> all reported cases of complicating mediastinitis and emphasized its severity. Mosher<sup>13</sup> long ago said that the esophagus is a septic canal and perforation usually results in mediastinitis and death.

In the various articles reviewed, stress has been laid on the high mortality of esophageal perforation. For example, Carmody,<sup>14</sup> in 1935, reported nine fatal cases. Neuhoﬀ,<sup>15</sup> in 1936, discussed mediastinal infections and stated that they were not rare and were usually caused by traumatic perforation

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of the esophagus and infections of the cervical region. He advised immediate operation when perforations occurred, using a cervical approach for the upper esophagus and a posterior paravertebral approach for the lower portions of the esophagus as the only hope of saving life.

A search was made in the recent literature for discussion of the rôle of chemotherapy in general and penicillin in particular. In 1942, McHenry<sup>16</sup> reported two cases of mediastinal foreign bodies in which external drainage was used. One of the patients also received sulfonamides. Both recovered slowly. In 1943, Greenwood<sup>17</sup> reported three cases of mediastinitis secondary to cervical pathology, none due to trauma of a foreign body, but one patient had drainage externally and was given sulfonilamide, with recovery. Baum<sup>18</sup> reported a case of a jackstone in the esophagus with perforation, mediastinitis and recovery. After waiting 12 days, the foreign body was removed. No chemotherapy was used. Simpson<sup>19</sup> reported a case of mediastinitis produced by trauma of a fish bone. The bone was never found, but bleeding of the esophageal wall was seen. Incision of the left side of the neck was performed and sulfadiazine was used. There was slow but complete recovery. Grace and Irwin<sup>20</sup> reported a case of perforation of the esophagus by a broken acrylic denture. The patient rapidly became comatose. Twenty-four hours after the injury, drainage of the neck and upper mediastinum, on both sides, was done. The patient was given heavy doses of sulfathiazole. The foreign body was never found. The patient recovered.

Hoover,<sup>21</sup> discussing mediastinitis as a complication of esophagoscopy and instrumentation of the esophagus, states that most perforations occur either from foreign bodies or from instrumentation. He recommends early surgical drainage and chemotherapy, both sulfonamides and penicillin. He makes the exception of those cases in which the infection is localized and draining into the pharynx or esophageal lumen. In these he does not advise external drainage.

Sutton<sup>22</sup> reported a fatal case of mediastinal abscess caused

by esophageal perforation by a piece of glass. Lumsden and Logan<sup>22</sup> report a case of mediastinitis in a service man in the Middle East. This case has several points of interest and is quoted in detail. The patient felt a "piece of wood" sticking in his throat while drinking tea on Nov. 14, 1944. Two days later, he had dysphagia, but four days after the accident he was symptom-free. On Nov. 22, eight days after the accident, he was esophagoscoped and a narrow horizontal slough was found on the right side in the lower postcricoid region. No foreign body was seen. He was placed on sterile water and sulfathiazole powder every four hours. The next day his temperature was 100°, pulse 112, and respiration 22 per minute. There was fullness in the supraclavicular region on both sides and an area of emphysema on the right side. Water by mouth was stopped and he was given intravenous glucose—saline with sodium—sulfathiazole (6 gm. in 24 hours). Intramuscular penicillin was started, 15,000 units every three hours. Twenty-four hours later his condition remained unchanged. X-ray showed enlargement of the upper mediastinal shadow on the right side with a well defined limiting margin extending from the root of the lung upwards into the neck, and surgical emphysema in the lower neck, especially on the right side. On this day, Nov. 24, right mediastinotomy was done and two or three ounces of offensive purulent fluid evacuated. No foreign body was found. Culture showed moderate growth of hemolytic streptococcus and slight growth of staphylococcus aureus. Both were penicillin-sensitive but sulfathiazole-resistant. The temperature and pulse remained elevated but the general condition improved. There was profuse discharge from the neck wound. Three days after operation, sulfathiazole was stopped (total dosage in first course, 24 gm. A culture from the wound now showed a moderate growth of staphylococcus aureus penicillin-resistant, and a slight growth of nonhemolytic streptococcus slightly penicillin-sensitive. Because a few sips of boiled milk appeared in the neck wound, a gastrostomy was done on Nov. 29. On Dec. 5 (11 days after neck operation), the mediastinal shadow had decreased and the emphysema resolved. The penicillin was stopped (total dosage in first course,

1,315,000 units). The wound culture gave heavy growth of staphylococcus aureus, penicillin-resistant, moderate growth of nonhemolytic streptococcus, penicillin-sensitive, and a slight growth of diphtheroids, penicillin-sensitive. The patient improved until Dec. 10, when the temperature and pulse rose and pain occurred in the upper right chest on coughing. X-ray showed slight loss of translucency in the right upper lung field. Sulfathiazole was then given by gastrostomy and intramuscular penicillin resumed. Total doses in second course, 70 gm. of sulfathiazole and 890,000 units of penicillin. That evening the patient coughed up five ounces of pus, and ten ounces of pus came out of his neck wound. The next day he was better. During the next four weeks he had a variable productive cough and it was believed that he had a bronchial fistula. Sputum culture gave moderate growth of staphylococcus aureus, penicillin and sulfathiazole-resistant and a slight growth of nonhemolytic streptococcus that was penicillin-sensitive. On Dec. 12, 10 cc. of lipiodol were instilled into the neck fistula and were seen to collect mostly in the midline at the level of the sixth dorsal vertebra, with a small amount also in the right upper lung field. On Jan. 12, at bronchoscopy, some mucopus was seen in the eparterial bronchus and there was some edema of its ostium. Esophagoscopy and X-ray of the esophagus showed a stricture two inches below the upper end of the esophagus. He was finally discharged from the hospital on April 20, for transfer to England, with the expectation of using esophageal bouginage for relief of the stricture. It is interesting to note that the mediastinitis was not manifest until nine days after the accident. The careful examination of cultures is commendable and shows that some organisms can become penicillin-resistant. The penicillin was not given in large enough doses or continued long enough, as was shown by subsequent development of a relapse.

Flett,<sup>6</sup> in 1945, discussed esophageal foreign bodies and their complications at some length from his experience with 100 cases. He reported five patients with cellulitis or abscess formation, two of whom died. One of his cases is particu-

larly interesting because of the similarity in origin to the one herein reported. A chicken bone became stuck in the esophagus and was then vomited out on March 1, 1941, the bone being bloody on both ends. On June 1, a large brawny swelling appeared on the right side of the neck, the temperature was 103° F., the pulse 120. Flett was unable to enter the esophagus, and a right lateral neck dissection was done. There was much cellulitis present, and a very foul odor encountered at the entrance of the mediastinum, but no pus. A soft rubber drainage tube was inserted. The patient was given "large doses" of sulfapyridine by mouth. Then foul pus drained from the wound. The patient was discharged well, 10 days later. Flett indicated that these cases are individual problems. He also said that although he hadn't used chemotherapy much as yet (sulfapyridine in one case only), he felt that the sulfonamides and penicillin "should render these very serious complications much less dangerous to life." Magnier,<sup>24</sup> in 1945, reported a case of mediastinal abscess secondary to lobar pneumonia. The patient was treated by aspiration and penicillin, 100,000 units, was given daily for seven days, with recovery.

Jones,<sup>25</sup> in 1946, reported two cases of perforation of the esophagus with foreign body in which the patient recovered. Penicillin was used in both. In the first case, a 49-year-old woman, a probang had been used. One week later she was seen by Jones. Her temperature was 101.8° F.; there was substernal pain and 12-pound weight loss. She was put on 25,000 units of penicillin every three hours. An X-ray showed the foreign body and the perforation. The next day she was better. The foreign body was removed under general anesthesia. Two days later she felt entirely well. The penicillin was continued for a duration of 10 days. Nine days after the patient was first seen, the esophagus was normal. In the second case the patient had choked on a piece of beefsteak 10 days previously, and when seen had a temperature of 100° F., and substernal pain. An X-ray showed an ulcer of the esophagus but no foreign body. Twenty-five thousand units of penicillin every three hours were given and the

symptoms were gone in three days. Thirteen days later, the esophagus was normal upon X-ray examination. In these cases it is seen that larger doses of penicillin were used, the first patient receiving a total of 2,400,000 units.

#### CASE REPORT.

The following case of a foreign body in the esophagus with multiple complications, including mediastinitis, is reported. The patient, a 56-year-old white male, felt something stick in his throat while eating fried chicken at dinner the evening of May 10, 1946. He immediately noticed severe pain on swallowing and was unable even to drink liquids. He was seen by me about two hours later. Examination of the throat



Fig. 1. Lateral X-ray of neck taken May 10, 1946, showing evidence of bony foreign body in upper esophagus, confirmed by fluoroscopy with cotton-ball soaked with barium.

showed a little saliva collected in the pyriform sinuses on indirect laryngoscopy but nothing else. The general physical examination was negative. The patient had a small partial lower denture. A lateral X-ray film failed to show a foreign body definitely (see Fig. 1), but on fluoros-



copy a cotton-ball soaked with barium was seen to stop in the upper esophagus just below the level of the cricopharyngeal muscle. The lung fields were clear on fluoroscopy. The patient was admitted to the hospital. Because of the probability that the foreign body was sharp-pointed and because the patient was short and stocky, with a very short, thick neck, it was decided to perform esophagoscopy under ether anesthesia. This was done the same evening. Great difficulty was experienced in getting the patient anesthetized. Esophagoscopy was begun, but before insertion of the scope was completed, it had to be withdrawn because the patient started retching. He then vomited a large amount of fluid and also a piece of chicken bone, 2.4 cm. long, and needle-sharp at each end (see Fig. 2). The patient was turned on his side and his pharynx suctioned free of vomitus as thoroughly as possible. After the vomiting had stopped, anesthesia was deepened and esophagoscopy was performed. There was a small amount of blood in the hypopharynx, the cricopharyngeal muscle was rather spastic, and a small blood-tinged excoriation was seen on the right wall of the esophagus at the level of the cricopharyngeal muscle. The rest of the esophagus appeared normal. Because



Fig. 2. Foreign body, actual size.

there had obviously been some trauma to his esophageal mucosa, although the depth of trauma could not be determined, he was started on penicillin, 40,000 units every three hours, as soon as he was returned to his room.

The following morning his temperature was  $38^{\circ}$  C., and there was considerable discomfort on swallowing, although he was able to swallow liquids very well. That evening his temperature rose to  $38.6^{\circ}$  C. His R. B. C. was 5.55 million; Hb., 116 per cent; W. B. C., 35,250; differential count: stab. cells, 19; segs., 74; lymphocytes, three; monocytes, four. He was given parenteral fluids. The next day he appeared a little worse. His temperature again reached  $38.6^{\circ}$  C, pulse 120, respiration 32. He noticed occasional substernal pain on swallowing. There was a small amount of subcutaneous emphysema in the suprasternal notch, and some diffuse swelling on the right side of the neck. The lung fields were clear. His blood count showed: R. B. C., 4.36 million; Hb., 84 per cent; W. B. C., 15,100; differential: eosinophile, 1; stabs., 14; segs., 66; lymphocytes, 13; monocyte, one. Penicillin was increased to 50,000 units every two hours. The following day the patient began to complain of pain in the right lower chest, and there was some suppression of breath sounds and dullness to percussion over the right lower lung field. There



was some widening of the upper mediastinum to percussion. There was slight dyspnea. We thought that he had an upper mediastinitis and was developing an atelectasis of the right lower lobe, with an early pleural effusion, most likely because of aspiration of some food particles which might be lodged in the right lower lobe bronchus. X-rays taken that day were reported as showing fluid in both pleural cavities extending to the level of the fourth rib anterior on the left, and to the third anterior intercostal space on the right, obscuring the heart borders; air in the subcutaneous tissue on the right side of the neck; no shift of the mediastinum on inspiration and expiration; diaphragms obscured

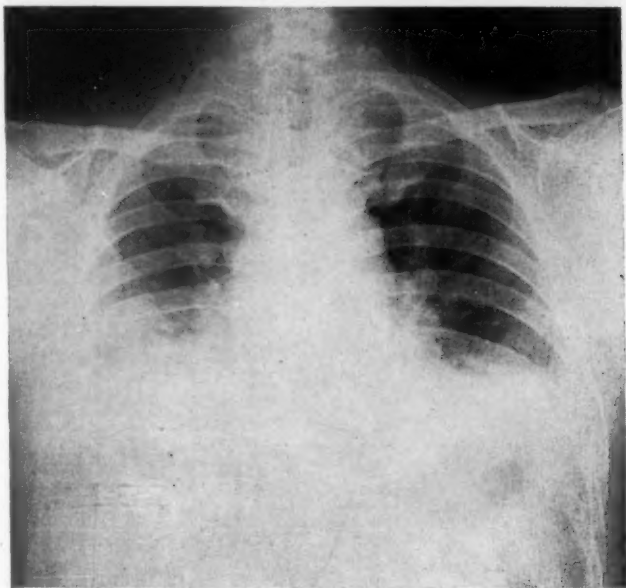


Fig. 3. Chest X-ray taken May 13, 1946, three days after removal of foreign body, showing particularly fluid in both pleural cavities.

by the fluid; air in the soft tissues anterior to the cervical spine displacing the lower portion of the pharynx and larynx anteriorly (see Figs. 3 and 4). Sulfadiazine 1 gm every four hours was started. Consultation was obtained with both a bronchoscopist, Dr. M. F. Arbuckle, and a chest surgeon, Dr. Thomas Burford, who thought that thoracentesis was not indicated as yet. It was decided that bronchoscopy should be done because of the likelihood of blocking of the right lower lobe bronchus by aspiration of food particles, and that evening bronchoscopy was performed. Because of the previous difficulty with ether anesthesia, avertin (50 mg.) per rectum, plus 10 per cent cocaine locally

was chosen for the anesthetic. As the bronchoscopy was started, before the larynx could be exposed, the patient suddenly developed a severe laryngeal spasm and stopped breathing. He rapidly became extremely cyanotic. Since the spasm apparently could not be overcome with the bronchoscope, an emergency tracheotomy was started. Because of the short, thick structure of the neck, this procedure was extremely difficult. There was profuse bleeding. The bronchoscope was finally inserted through the larynx just as the trachea was exposed in the neck; there-



Fig. 4. Lateral X-ray film of the neck taken May 13, 1946, showing air in the soft tissues anterior to the spine displacing the lower portion of the pharynx and larynx anteriorly.

fore, since the airway had been re-established, all bleeding in the neck wound was controlled before the trachea was incised. Inspection of the tracheobronchial tree revealed that the mucosa of the right lower lobe bronchus was fiery red, but not occluded. No foreign material was seen. A No. 7 long tracheotomy tube was inserted and a penicillin gauze pack placed around it in the wound. The patient was returned to his room in fair condition. The breath sounds were much clearer at the right base after bronchoscopy.

His course was stormy. He required constant care by special nurses. He continued to have fever and a slightly elevated pulse; however, his respirations were easier and the pain in the right chest decreased markedly. Considerable purulent material was frequently suctioned from the tracheotomy tube. Indirect laryngoscopy revealed the larynx to be very red, and the true cords very edematous. The tube was changed every other day and each time a smaller gauze pack was used. This pack was soaked with penicillin, 2,000 units in 5 cc. of saline, every three hours. On May 14 his W. B. C. was 20,000; differential: eosinophile, one; stabs., 15; segs., 76; lymphocytes, 8; monocytes, one. On May 17 portable X-rays showed decrease in the amount of fluid in the left pleural cavity with fluid level at the seventh rib anteriorly, and an increase in the

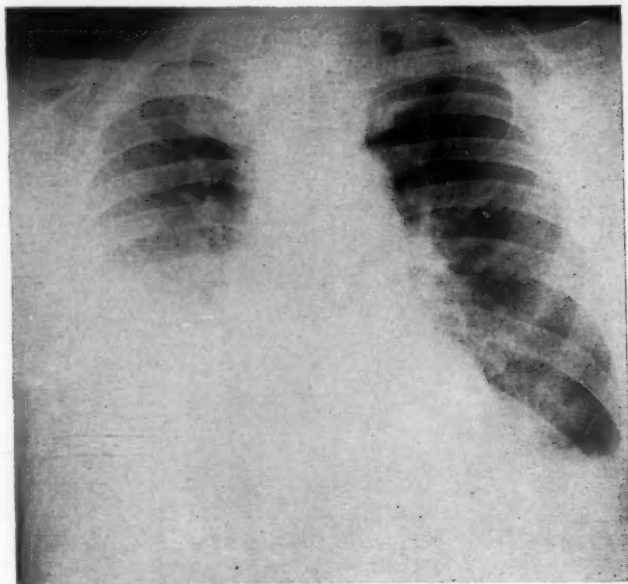


Fig. 5. Portable chest X-ray taken May 17, 1946, showing decrease in fluid in left pleural cavity and increase in fluid in right pleural cavity.

amount of fluid in the right pleural cavity extending to the level of the third anterior intercostal space (see Fig. 5). By May 18 he had definitely accumulated more fluid in his right chest, and a thoracentesis was done. Six hundred sixty cc. of blood-tinged fluid were removed. Culture showed *B. pyocyaneus*. Respirations were much easier following this.

By May 20 the patient was showing definite improvement; tempera-

ture 37.6° C., pulse 88, respiration 22. On May 22 the temperature became normal and remained so. Blood count showed: R. B. C., 4.59 million; W. B. C., 10,800; Hb., 86 per cent; differential: basophile, one; eosinophiles, two; stabs., five; segs., 64; lymphocytes, 25; monocytes, three. A No. 5 tube was inserted in the tracheotomy wound and the opening stopped with adhesive. On May 24 the tracheotomy tube was removed without difficulty. On May 25 X-rays showed marked clearing of the lung fields, and no emphysema in the neck tissues (see Figs. 6 and 7). The penicillin doses were reduced to every three hours, and the sulfadiazine to every six hours. By this time the patient was well on

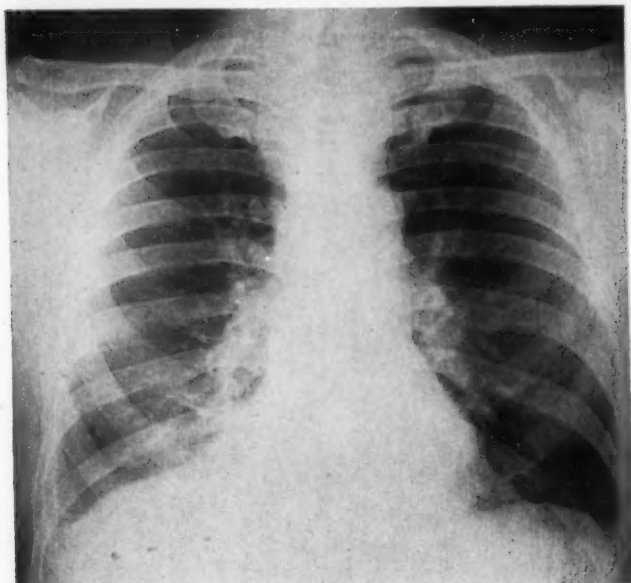


Fig. 6. Chest X-ray taken May 25, 1946, showing clearing of lung fields.

the road to recovery. On May 26 the sulfadiazine was stopped. The patient was put on a soft diet with rapidly increasing quantity of food. On May 29 the penicillin was further reduced to 30,000 units every three hours, and was discontinued entirely on May 30. Total dosage of sulfadiazine, 69 gm.; of penicillin, 9,610,000 units. Favorable progress continued, and on June 3 the tracheotomy fistula had closed and the patient was discharged from the hospital. By this time he was eating a regular diet without difficulty. By June 18 the tracheotomy wound was completely healed and no further dressing was needed. The patient recovered his strength and feeling of well-being slowly, but returned to work completely well by July 1. The larynx was entirely normal on examination at this time.

DISCUSSION.

This case is interesting in that serious complications rapidly followed a foreign body in the esophagus, and its removal. The development of what appeared to be a lobar pneumonia



Fig. 7. Lateral X-ray of the neck taken May 25, 1946, showing resolution of emphysema in the neck tissues.

and pleural effusion, presumably due to aspiration of liquid vomitus, is also unusual. Severe laryngeal spasm developing just prior to bronchoscopy, requiring tracheotomy, was a sudden and desperate complication.

The determining factor in his ultimate recovery was thought to be the tremendous amount of penicillin given; otherwise, we believe that the sepsis would have been overwhelming. Small doses of penicillin invite the possibility of

organisms developing resistance to the drug, as was seen in the case reported by Lumsden and Logan. Patients given moderate doses of penicillin frequently do not show the marked improvement which follows increase of the dosage. Previous experience with cases of mediastinitis indicates that the infection is apt to be an overwhelming one, and that the sulfonamides alone are insufficient to cope with it.

The question arises whether or not it would have been advisable to do a prophylactic mediastinotomy immediately when it was seen that there was trauma to the esophageal wall. The difficulty here is that one is frequently unable to determine the depth of such trauma. Even though the mucosa is damaged, if the muscular layer of the esophagus is not pierced, there is a good likelihood that cervical or mediastinal infection may not develop. In a case of obvious perforation of the esophageal wall it would seem to be an urgently indicated step. Personal experience with one case in which perforation with the scope occurred during diagnostic esophagoscopy in a 76-year-old white man bears this out. In this case, perforation occurred at the level of the cricopharyngeal muscle on the right side and was immediately recognized. A right cervical mediastinotomy was done at once and the upper entrance to the mediastinum packed off with iodoform gauze. A rubber dam drain was inserted next to the upper portion of the esophagus and a feeding tube was inserted. The patient was then given 50,000 units of penicillin every two hours and 1 gm sulfadiazine every four hours. The temperature rose to 101.6° F. the afternoon of the operation, but thereafter was normal and no symptoms of infection ever developed. Four days later, the iodoform pack was removed, and three days following this, the rubber dam-drain was also removed. Penicillin was stopped on the seventh day. Total dosage, 3,380,000 units. The sulfadiazine was stopped on the eleventh day. Total dosage, 66 gm. In the case under discussion the depth of the damage was uncertain; furthermore, the patient had just had a difficult episode with ether anesthesia, his body build was such that any operative procedure on the neck would be difficult, prolonged and cause severe

strain. This, incidentally, was borne out when tracheotomy became necessary; therefore, it was felt that a mediastinotomy was not indicated.

# CONCLUSION.

The conclusion to be drawn from this case is the extreme importance of the prompt and adequate use of penicillin in any case of foreign body of the esophagus with damage to the esophageal wall and its resulting complications. It is without doubt a life-saving weapon in the treatment of the very severe sepsis which is so likely to occur in cases of this type.

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## THE CLASSIFICATION OF CARCINOMA OF THE LARYNX.\*†

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The purpose of classification of varieties of a disease is to improve our understanding of the therapeutic approach to each variety and the prognosis of such treatment. Two important factors must be considered in planning treatment of cancer of the larynx: The first is the site and extent of the lesion; the second, its histologic variety.

The terms "intrinsic" and "extrinsic" are commonly used to describe a laryngeal carcinoma; yet I have found considerable differences of opinion among laryngologists as to the meaning of these terms. To some, "intrinsic" describes a lesion within the confines of the larynx. St. Clair Thomson<sup>1</sup> defines as intrinsic, "Growths starting from the vocal cords, the ventricles, the ventricular bands or the interarytenoid region." Others confine the term "intrinsic" to cancer involving the true vocal cord only, while others use the term to include those lesions which, although originating in the laryngeal box, have spread to adjacent tissues — for example, to the base of the epiglottis.

The lymphatic drainage from the true vocal cords is so scant that cancer involving the true cord is a relatively benign lesion. Histologically it is usually a well differentiated lesion, Broder's Type I or II; therefore, it is usually slow in growth and slow to metastasize.

Such a lesion responds admirably to the more conservative surgical approaches. Laryngofissure as advocated by Thomson, Jackson, Orton and others has resulted in cures in over 80 per cent of such cases. New and Figi and LeJeune have

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1. Cancer of the Larynx. Thomson and Colledge. Macmillan and Co., 1930, p. 13.

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had excellent results with the endolaryngeal removal either with or without cautery. The prognosis of cancer of the true vocal cord, therefore, is good.

Lymph drainage from parts of the larynx, other than the true vocal cords, is plentiful; therefore, metastases from a cancer in any part of the larynx other than the true cord can be expected relatively early. It seems erroneous to classify lesions of such anatomically different structures under the same heading.

It is generally agreed that cancer anywhere in the body is most successfully treated if it can be totally extirpated. Even the most enthusiastic advocates of Roentgen therapy agree that, where it is possible, surgery is the treatment of choice for cancer. Especially is this true of the larynx.

The response of neoplasms to radiant energy is usually in direct ratio to the cell differentiation of the tumor. The more rapidly growing and undifferentiated the growth the more likely is it to be affected by X-rays.

With these considerations in mind, the following classification of cancer of the larynx is suggested.

*I. Intrinsic:* Confined to the true vocal cord only.

*II. Endolaryngeal:* Involving structures within the laryngeal box, *i.e.*, the ventricles, ventricular bands, arytenoids and interarytenoid space; also those cancers of the vocal cord which have spread across the anterior commissure.

- |                      |                                            |
|----------------------|--------------------------------------------|
| a. Without           | } fixation of the vocal cord or arytenoid. |
| b. With              |                                            |
| c. Histologic grade. |                                            |

*III. Subglottic.*

*IV. Extrinsic or Extralaryngeal.*

#### INTRINSIC.

As mentioned above, this is a relatively benign lesion and usually responds to surgical removal either by laryngofissure

or by endolaryngeal removal. The prognosis is good; over 80 per cent of cures has been reported by different observers.

#### ENDOLARYNGEAL.

Being confined within the limits of the larynx, endolaryngeal cancer can usually be removed completely by total laryngectomy. Many endolaryngeal cancers, where there is no fixation of the vocal cord and where the lesion is histologic Grade I or II, have been successfully treated by laryngofissure.

Endolaryngeal cancer in the absence of palpable cervical glands is a surgical condition and has, in general, a fair



Fig. 1.

prognosis when adequate surgery is performed. The prognosis is less favorable where the glands of the neck are already involved.

Absence of palpable cervical glands does not necessarily infer that cancer cells have not already infiltrated the lymphatics. Arbuckle has stressed this point and feels that any cancer other than the true intrinsic should be treated by irradiation.

It is difficult to agree with this concept in view of the results of surgery as reported by Orton, Clerf, McCall and

others. I believe it should be emphasized that laryngectomy is not a disabling procedure if proper attention is paid to preoperative measures regarding the mental attitude of the patient and the institution of exercises to develop the esophageal voice. A patient with average intelligence can make himself understood easily and continue in productive work even without his larynx. In general, endolaryngeal cancer is a surgical condition, with a fair prognosis in cases without palpable metastasis.

#### SUBGLOTTIC.

Subglottic lesions are frequently overlooked because they are so difficult to see by indirect laryngoscopy. It is urged that Roentgenograms be used in the diagnosis of cancer of the larynx, particularly of subglottic cancers, because by this means the extent of the lesion can be well visualized and the choice of surgical removal or Roentgen therapy made. L. H. is an example. This patient, 68 years of age, consulted me on Oct. 26, 1946. He gave a history of intermittent hoarseness for some three years. Recently he had read in a popular magazine an article about hoarseness and cancer of the larynx and decided to consult a doctor. On examination of the larynx, I found a completely fixed right vocal cord, but except for a little thickening of the anterior end of the cord I could see nothing else amiss. Laminograms of the larynx revealed the subglottic lesion and biopsy proved it to be a carcinoma, Grade IV. In view of the patient's age, the extent of the lesion and the histologic grading, he was referred for X-ray therapy.

If the subglottic lesion is high under the vocal cord, and can be removed in a total laryngectomy, this should be done.

#### EXTRALARYNGEAL.

Cancer is seldom a surgical disease. The practical impossibility of complete removal of the lesion makes the prognosis poor. The prognosis should be based on the histologic grading, but one should be very sure of the lesion before being too specific in the prognosis. Example, P. M., a male aged 50,

who complained of pain in the throat for about one year and hoarseness for six weeks. Examination revealed a fixation of both arytenoids and a tumor involving both aryepiglottic folds. The tubercle of the epiglottis was large and red. Direct laryngoscopy revealed a tumor extending into the cricopharyngeus. Biopsy was done and the pathologist's report was Epidermoid Carcinoma, Grade III. I considered this inoperable and suggested X-ray therapy, but gave a very poor prognosis; in fact, I doubted whether the man would last a year. That was three years ago and he has no sign of cancer in the larynx today. Revision of the slides showed the tumor was in fact a lymphoepithelioma. He was last seen Nov. 4, 1946. He has a fixed left cord, a freely movable right cord, no evidence of tumor and is symptom free.

Extralaryngeal cancers have been successfully treated surgically either as Orton advises by the lateral pharyngotomy route of Trotter, or as New suggests in selected cases by suspension laryngoscopy with cautery followed by X-ray and radon implantation, but in general extralaryngeal cancer is not a surgical condition, and X-ray therapy is the treatment of choice.

#### SUMMARY.

1. A classification of cancer of the larynx is suggested.
2. "Intrinsic" should be reserved for cancers of the true vocal cord only.
3. Endolaryngeal cancers are in general surgical conditions with fair prognosis.
4. Subglottic cancers may be surgical; their extent is best observed by Roentgenograms.
5. Extrinsic or extralaryngeal cancer is usually inoperable and is best treated with X-ray. The prognosis is not good.

## A REPORT ON TWO UNUSUAL CASES INVOLVING FOREIGN BODIES.

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### *1. Foreign Body in the Tongue.*

On Aug. 22, 1945, a 47-year-old white police officer was seen in my office with complaints of marked dysphagia and a tremendously swollen, unbearably painful tongue. He had had a cold and sore throat for several days. Physical examination revealed a middle-aged man in apparently good condition, but who was unable to close his mouth, due to the tongue being twice its normal size in thickness and hard and fluctuating in the center on touch. The sublingual space was edematous on both sides, and in the middle of the right edge of the tongue there was a linear scar of about 1 cm. in length. Similar scars were found on the left side of the tongue and on the outside of both cheeks—these ran in a straight line paralleling the tongue scars, but were slight and scarcely visible. Patient stated that 23 years previously when he was cleaning a gun it had accidentally fired, and a bullet had entered his lower jaw, knocking out three teeth, passing through the tongue and exiting through the (left) cheek. He had made an uneventful recovery with no subsequent complications, and several years later he had had the remainder of his teeth extracted.

Further examination found the cervical glands in the anterior triangle to be palpable but not tender. Breathing was embarrassed only when the mouth was not kept open. Temperature reading was 102° F. Patient was hospitalized and penicillin injections (30,000 units every three hours) were immediately instituted; but on the next day the patient had not improved, the pain had increased, swelling and fluctuation were greater (patient thought that perhaps a piece of the bullet was still in his tongue), and an incision had to be made.

Procedure was as follows: Patient was placed in a sitting position with his head forward, tracheotomy was prepared for use if necessary to relieve the dysphagia, and after the tongue had been anesthetized with pontocaine (2 per cent solution) by topical applications, incision was made on the left side of the tongue. Foul pus was immediately and freely obtained. (Upon culture it proved to be streptococcus hemolyticus.) A drain was inserted and the penicillin treatment continued for two more days. Patient made a good recovery, his temperature became normal, he could swallow well and the pain had subsided almost at once upon incision; however, pus continued to exude, and on probing in the abscess cavity a foreign body could be felt.

The X-ray report was as follows: "Examination of tongue showed a large foreign body on the right side of the tip of the tongue, localized within a metallic ring marker. This marker was placed over the scar on the tongue. One large and several small shadows are seen on the

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right side of the tongue posteriorly. One large dense shadow is seen, having the shape of a tooth, which appears to be on the left side and seems to move with the tongue. Numerous other metallic bodies are seen over the nasal area."

After this tooth (which had been knocked in, not out, by the gun accident 23 years previously) was removed, the sinus discharge in the tongue ceased. Further probing did not locate the foreign bodies mentioned by the Roentgenologist, and the patient was discharged.

*Comment:* Foreign material is often implanted into the tissues, either as a support to fill out defects or spaces, or to unite fractured bone parts, etc. Such implantations, however, must be made with strict aseptic precautions, with the material itself inert and well tolerated by tissues, and the organ immobilized during healing, or, as a rule, the foreign body will be expelled. In this case, the tooth, when removed from the tongue, was septic. The initial wound (and implantation) was in the tongue (an organ of the mouth), where asepsis is not carried out, and also in an organ that, far from being immobilized — or immobilizable — is almost constantly in motion. In spite of all these facts, the tooth (foreign body) healed over in the tongue, where it remained in a dormant state for 23 years. The mechanics behind its sudden activation are not known by the author.

## 2. *Foreign Body in the Larynx and Trachea.*

A two-year-old colored boy was seen in 1945 at the Baltimore Eye, Ear and Throat Hospital Clinic, with a history of slowly developing hoarseness over a six months' period.

The child had no history of serious illness, was happy, ate and slept well, had no cough, discomfort or dyspnea, but was completely aphonic. He was, therefore, admitted to hospital for direct laryngoscopy and treatment. Without anesthetic, laryngeal examination revealed a round, button-like foreign body lodged between the cords. This was removed and we found it to be a 1¼-inch safety pin, straightened out perpendicularly, black, and so brittle it crumbled instantly. Immediately after its removal, the child regained his voice, was kept under observation for several days, but had no after-effects or complications.

The mother, when questioned, recalled an incident that had happened six months before, when she was dressing him and lost a safety pin. Evidently the child had found it and must have straightened it out while playing with it. Then, when he swallowed or aspirated it, the pin lodged between the cords. While surely the boy must have coughed to some extent at the beginning, he stopped before anyone became concerned about it, and the pin remained in position. When we found it, the point was hanging loose in the trachea and the keeper held tight in the subglottic space. There had been no irritation and the foreign body was well tolerated, except that the glottis did not close and aphonic sequelae were produced.

*Comment:* Foreign bodies of prolonged sojourn in the upper respiratory tract are not uncommon; furthermore, many times there are no symptoms. Jackson<sup>1</sup> feels that, usually, there is a prolonged symptomless quiescent period after aspiration of a foreign body into the lungs, and reports a case of 26 years' duration, asymptomatic for 24 years, with subsequent removal of the foreign body and the patient's complete recovery. Occasionally we find foreign bodies incidental to other diseases, or locate them accidentally in a routine X-ray examination or during endoscopy. The case here reported belongs in this group of rare occurrences.

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#### AMERICAN BOARD OF OTOLARYNGOLOGY.

The American Board of Otolaryngology will conduct the following examinations in 1947:

October 7 to 11 in Chicago, Ill., at the Palmer House.

Address inquiries to Dean M. Lierle, M.D., Secretary-Treasurer, Iowa City, Iowa.

## **SOUTH CAROLINA SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.**

The second annual meeting of the North Carolina Eye, Ear, Nose and Throat Society and the South Carolina Society of Ophthalmology and Otolaryngology will be held at the Hotel Skyland in Hendersonville, N. C., Sept. 15-18. The first two days will be devoted to ophthalmology and the last two to otolaryngology.

The otolaryngologists and the ophthalmologists from Georgia, Virginia and eastern Tennessee will be invited and we shall be pleased to have men from any other states attend.

Information about the course will be furnished by officers of either Society, whose names follow: North Carolina Society: Dr. V. K. Hart, president, Charlotte, N. C.; Dr. J. A. Harrill, secretary-treasurer, Winston-Salem, N. C. South Carolina Society: Dr. Ruskin G. Anderson, president, Spartanburg, S. C.; Dr. Roderick Macdonald, secretary-treasurer, Rock Hill, S. C.

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## **LOUISIANA-MISSISSIPPI OPHTHALMOLOGICAL AND OTOLARYNGOLOGICAL SOCIETY.**

The Louisiana-Mississippi Ophthalmological and Otolaryngological Society held its annual meeting at the Buena Vista Hotel, Biloxi, Miss., on May 5, 1947, under the direction of Dr. George Adkins, president, of Jackson, Miss. An interesting program was presented, followed by a social hour. Newly elected officers are as follows: Dr. Noel Simmonds, of Alexandria, La., president, and Dr. Edley H. Jones, of Vicksburg, Miss., secretary. The 1948 convention will be held in New Orleans, La.



